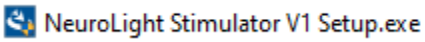
NeuroLight Stimulator Quick Start Guide

This quick start guide describes how to install the NeuroLight Stimulator software package, assemble the hardware, and use the NeuroLight Stimulator application.

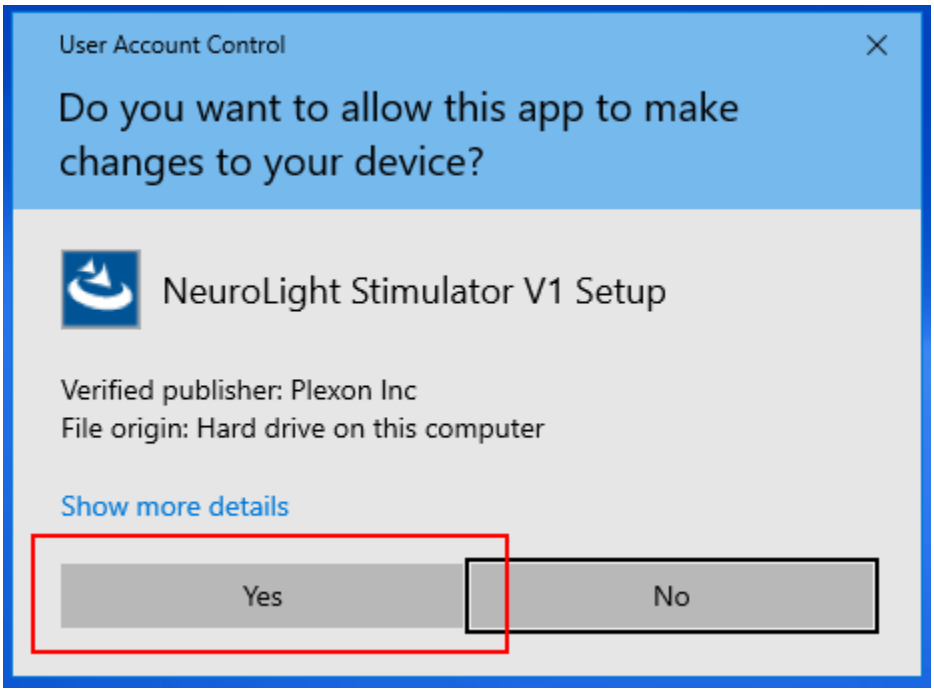
Software Installation

The NeuroLight Stimulator software package contains both the drivers and application for controlling the hardware.

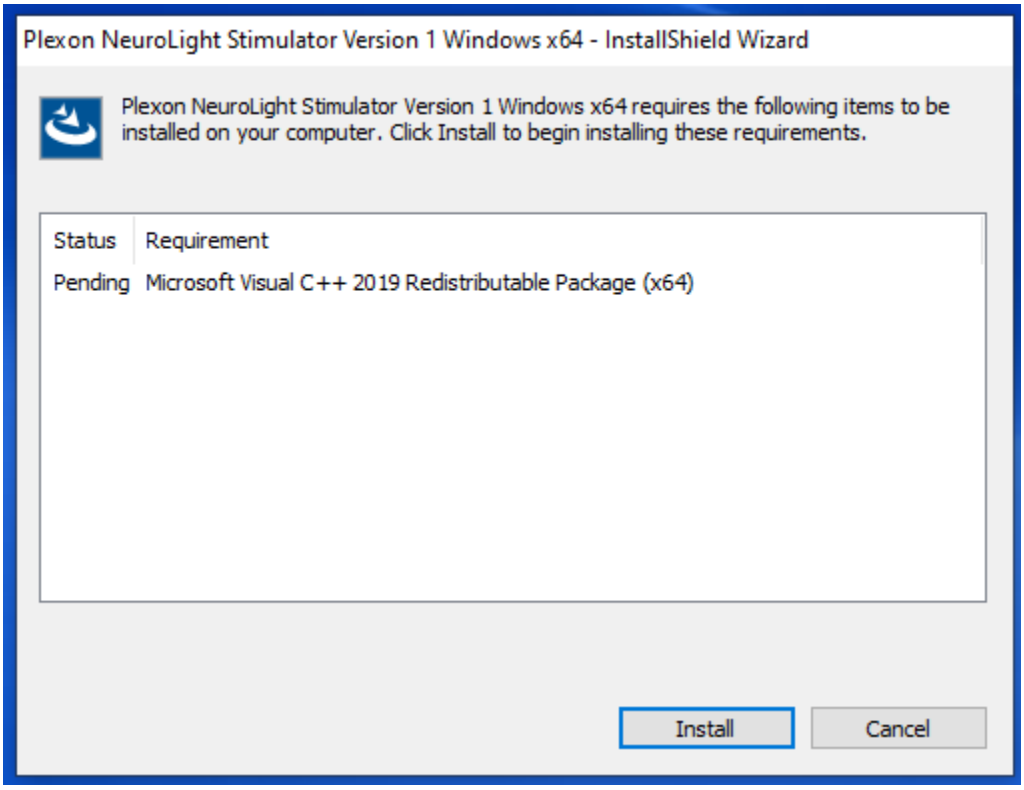
1) Double-click on the software package icon.



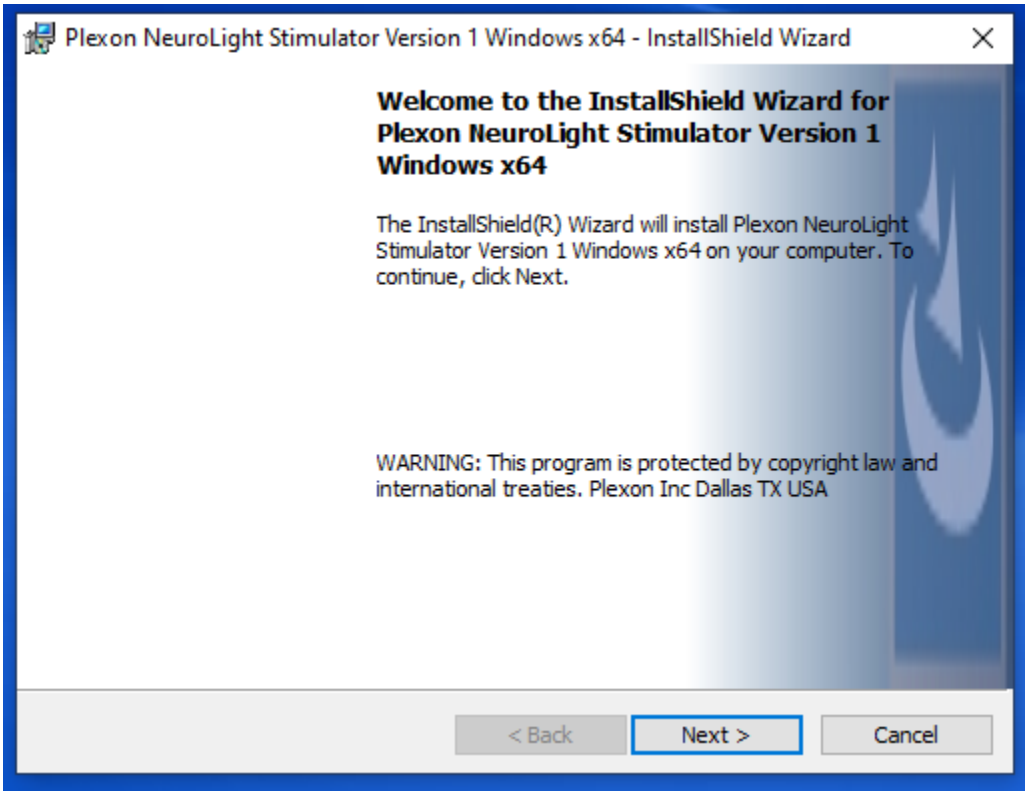
2) Click “Yes” when prompted if you want to make changes to your device.



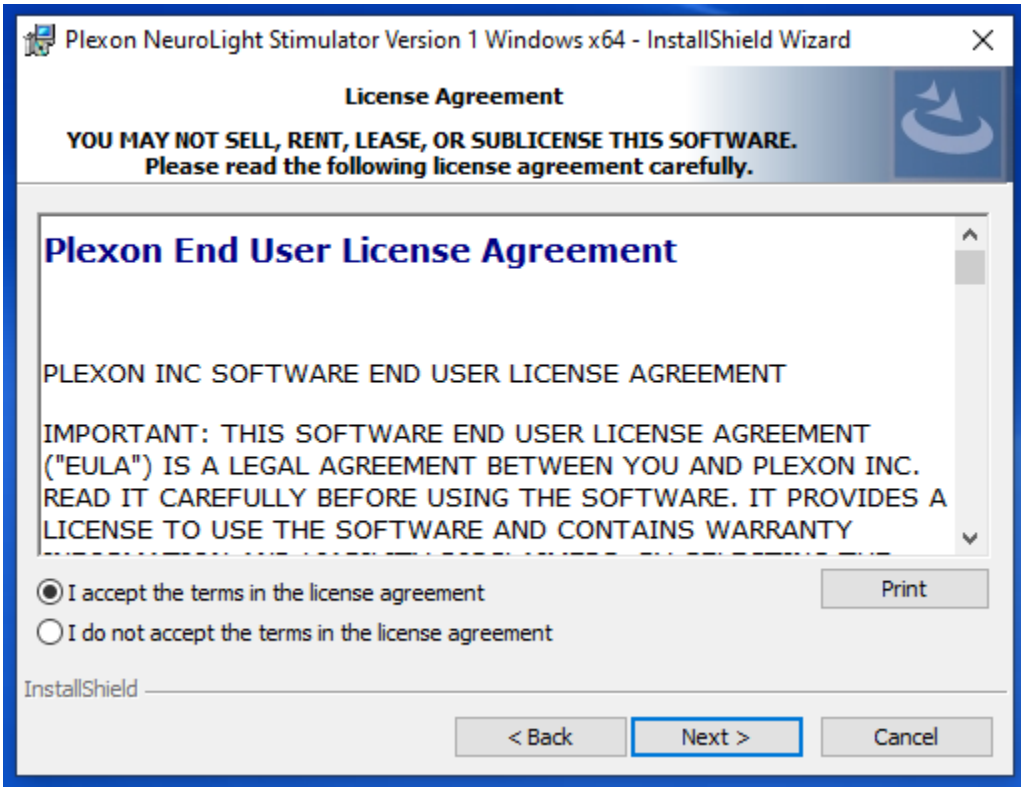
3) Click “Install” if prompted to install the Microsoft Visual C++ 2019 Redistributable package.



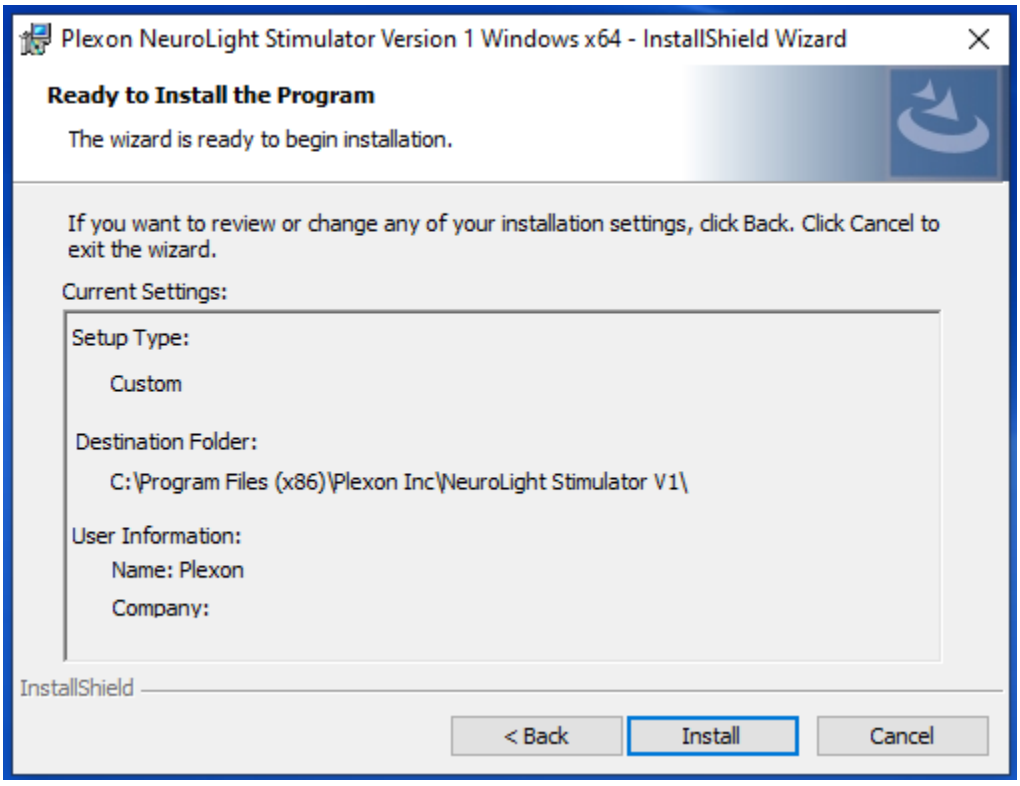
4) After the redistributable package has finished installing, click “Next”.



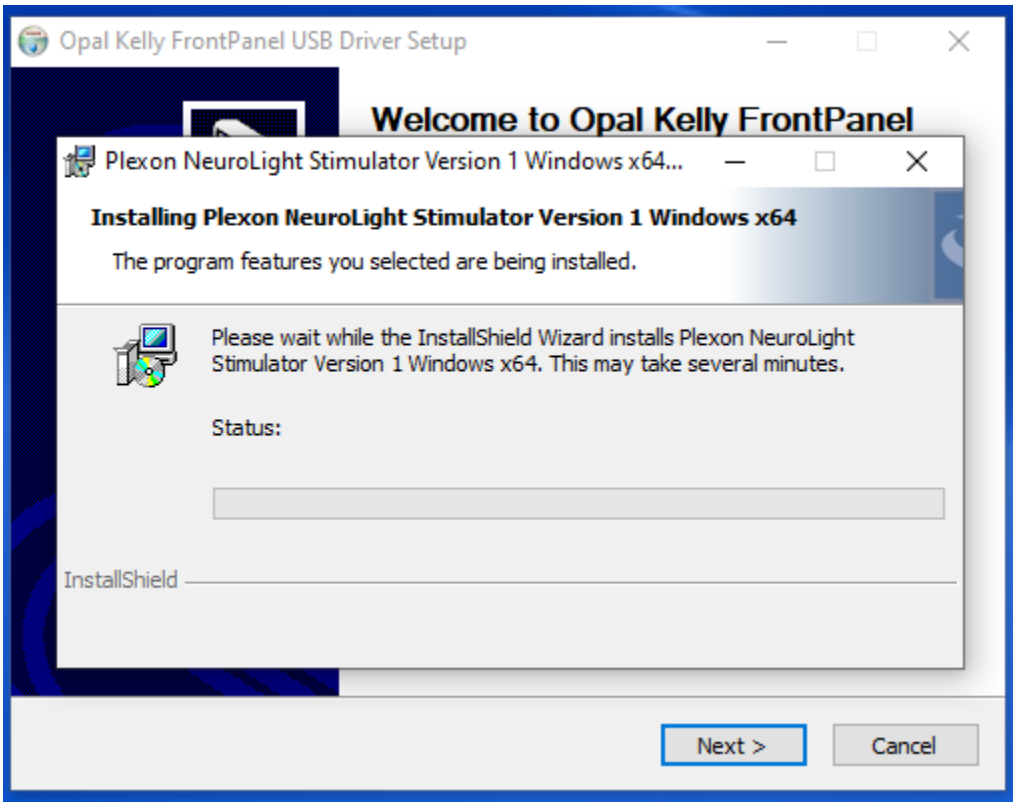
5) Select “I accept the terms in the license agreement” and click “Next”.



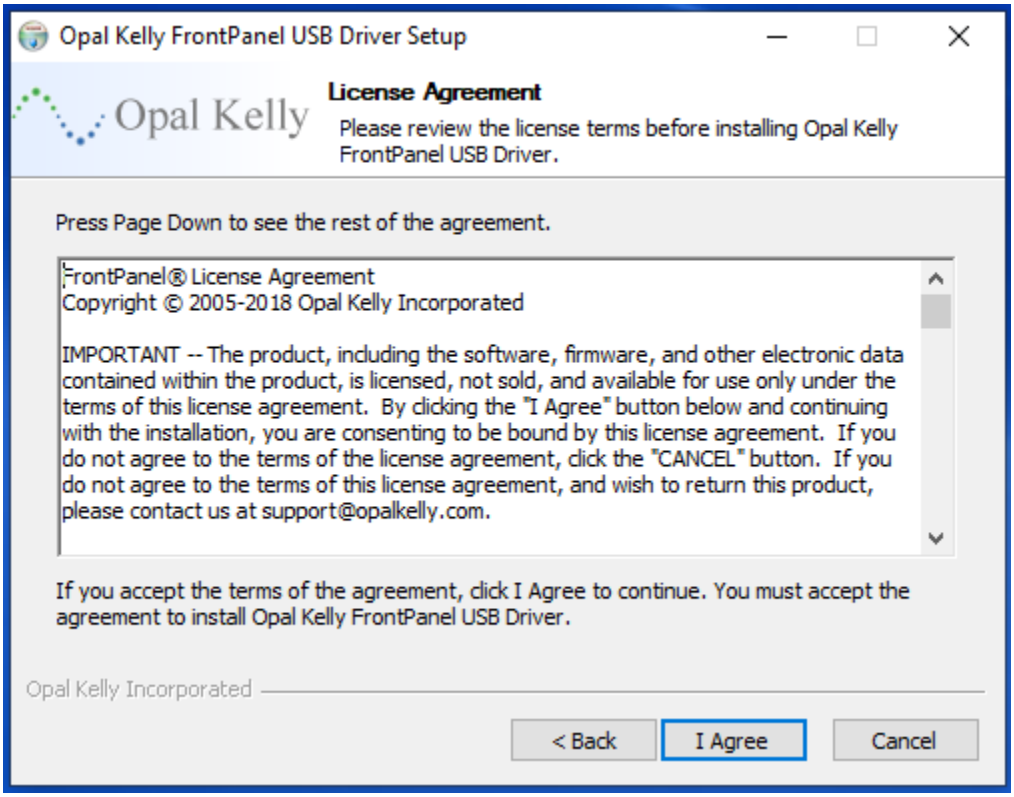
6) Click “Install”.



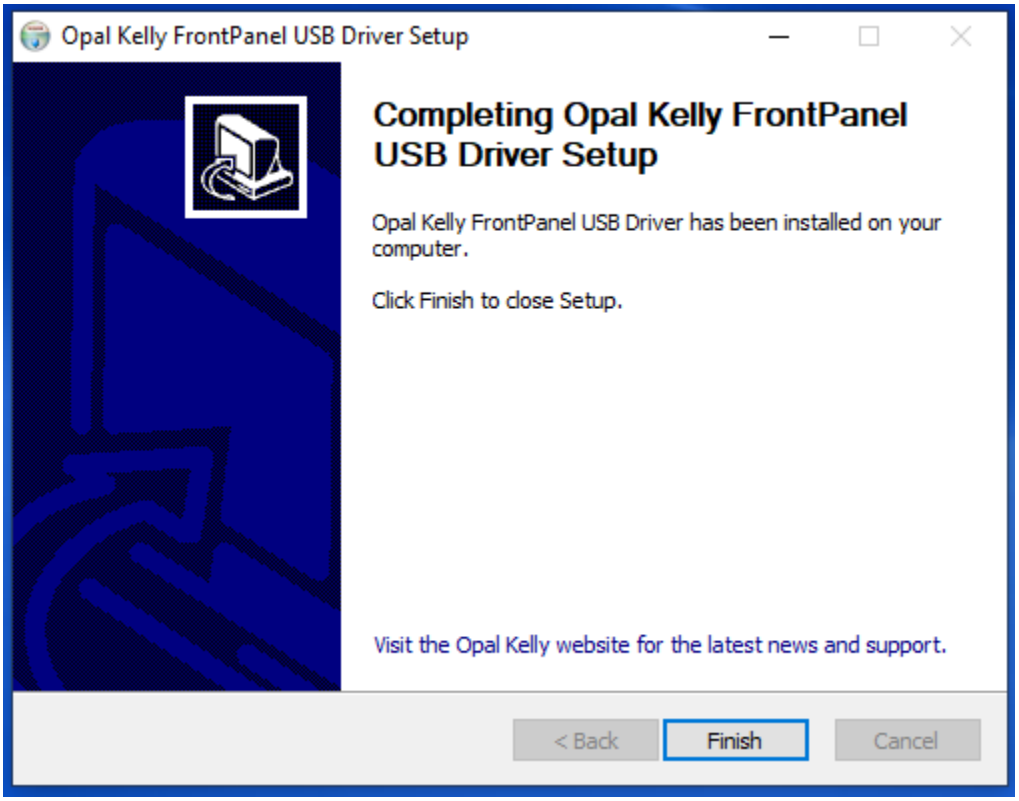
7) A window for The Opal Kelly FrontPanel USB Driver Setup will pop up behind the NeuroLight installer. Click “Next”.



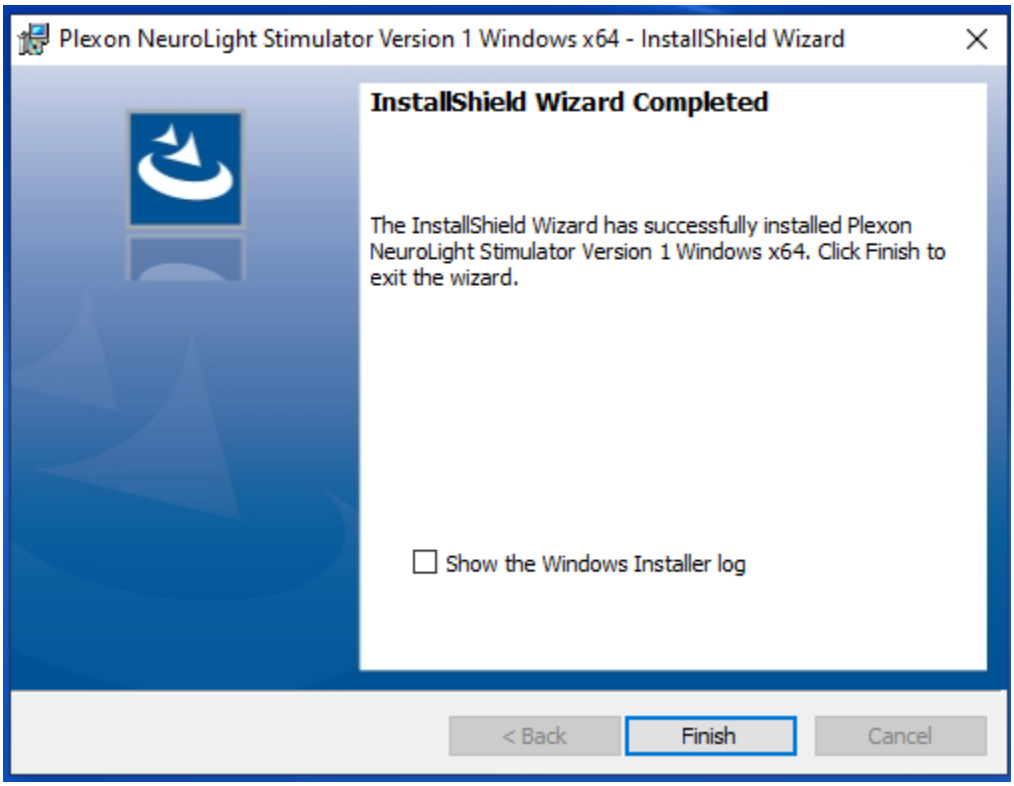
8) Click “I Agree” to the Opal Kelly license agreement.



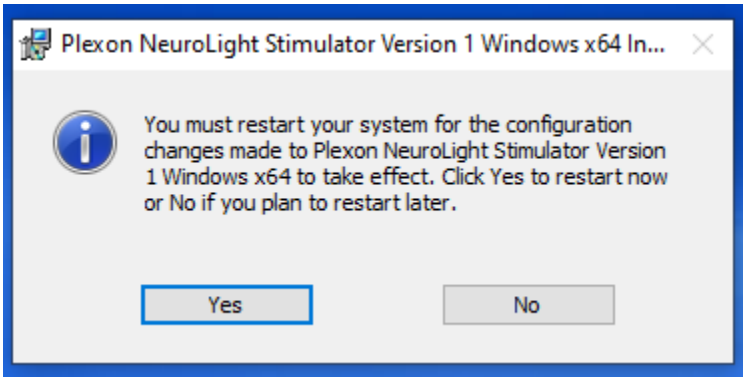
9) Click “Finish” to complete the Opal Kelly driver setup.



10) Click “Finish” to complete the NeuroLight software installation.



11) When prompted, restart the PC.



Hardware Assembly

1) Connect the power supply to the NeuroLight Stimulator control box

2) Connect the USB cable to the PC

3) Connect the headset cable to the control box

4) Connect the headset to the headset cable

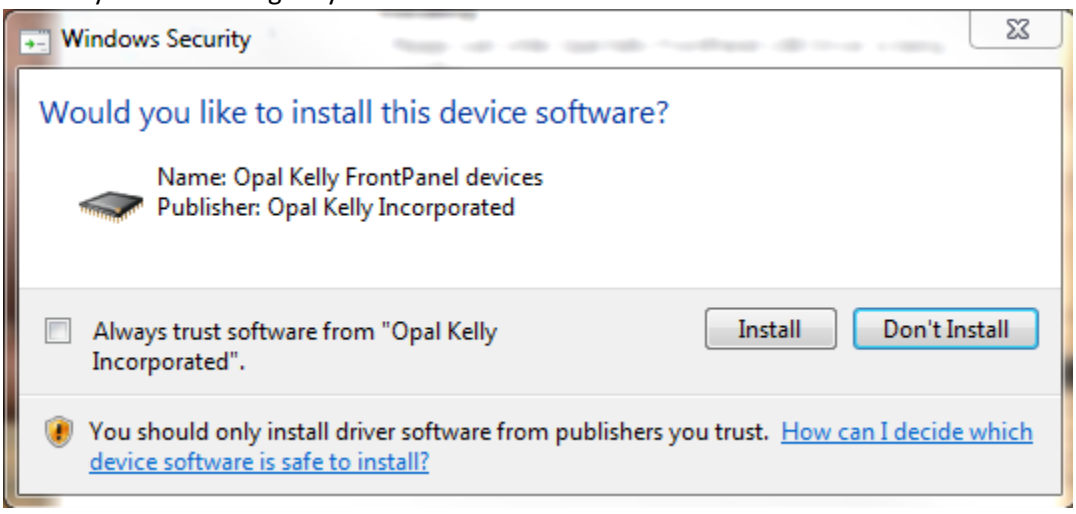
5) Connect the headset to the test board

Starting the NeuroLight Stimulator Application

The NeuroLight Stimulator application is where you can define patterns, apply them to channels, and start/stop channels.

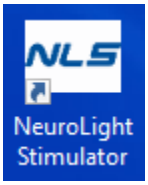
1) Turn on the power to the NeuroLight Stimulator. If this is the first time that the stimulator has been connected to the PC, it might take a moment to be detected and ready for use.

You may see this dialog on your PC.

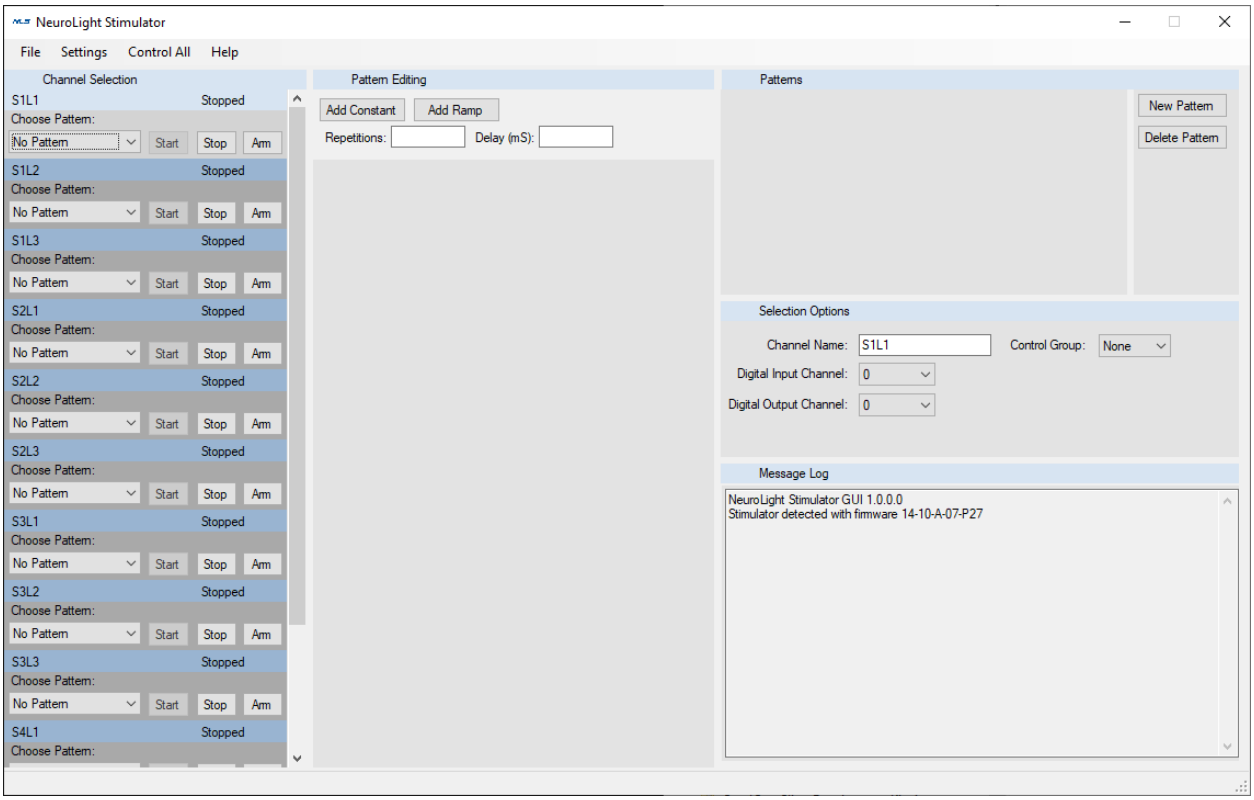


Click “Install” to finish this step.

2) Open the NeuroLight Stimulator application.

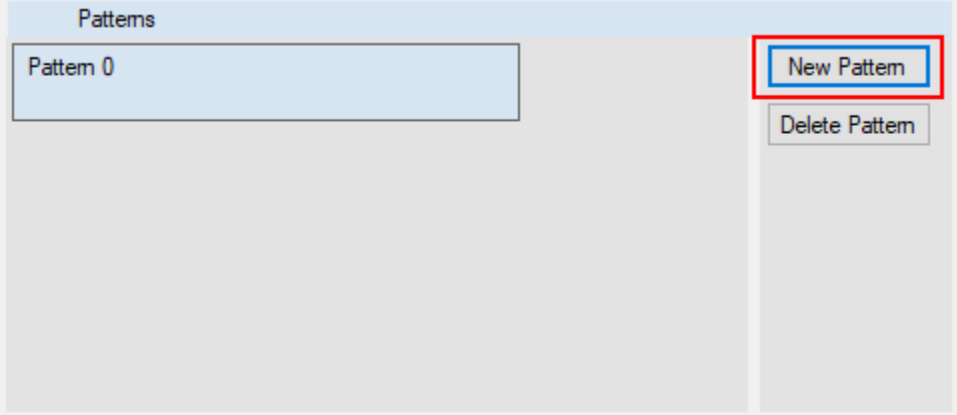


3) If the NeuroLight Stimulator hardware is correctly detected by the PC and software, the application will start and show the software version and hardware firmware number in the “Message Log” window. If the hardware was not detected, an error message will pop up and the software will close.

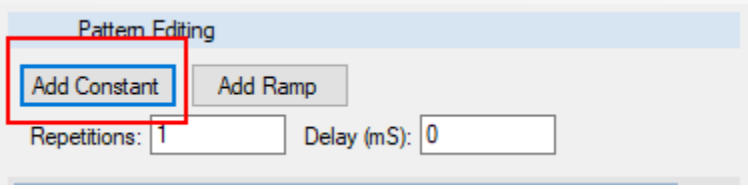


Basic Usage of the NeuroLight Stimulator Application

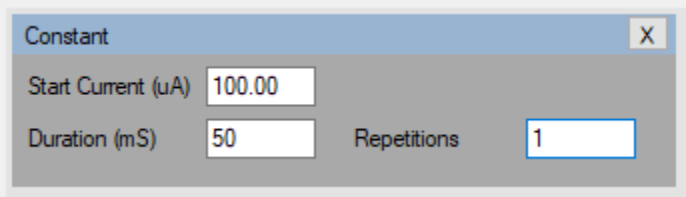
1) Create a new pattern by clicking “New Pattern” in the “Patterns” section.



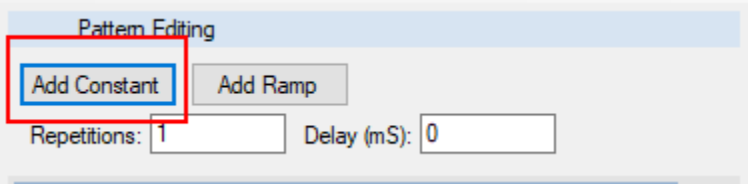
2) Create a new constant in the pattern waveform by clicking “Add Constant” in the “Pattern Editing” section.



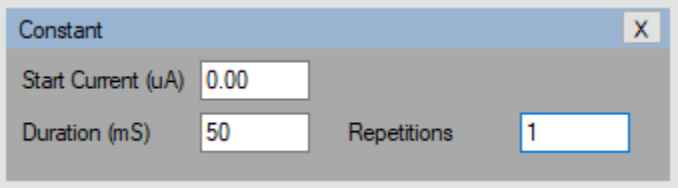
3) Set the “Start Current” in the newly created constant to 100 uA, and the “Duration” to 50 mS.



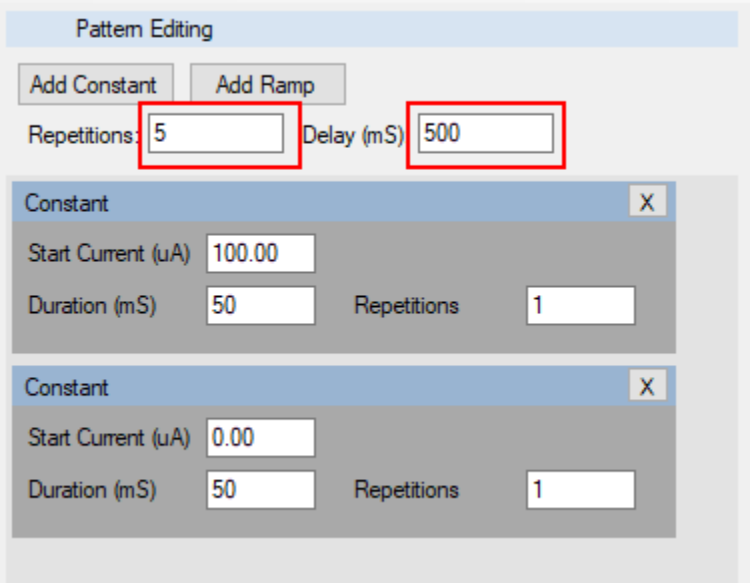
4) Create another new constant to the waveform by clicking “Add Constant”.



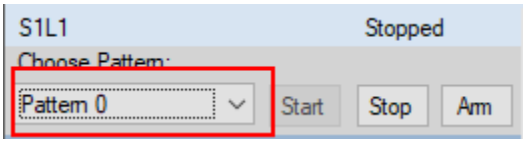
5) Set the “Start Current” in the newly created constant to 0 uA, and the “Duration” to 50 mS.



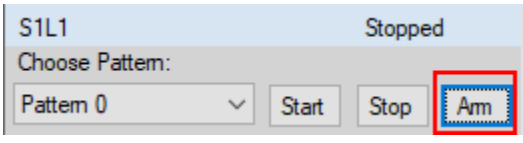
6) Set the “Repetitions” of the pattern to 5, and set the “Delay” in between repetitions to 500 mS.



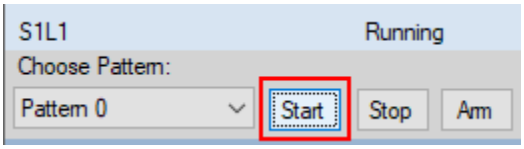
3) Set a channel to use the pattern.



4) Arm the channel.



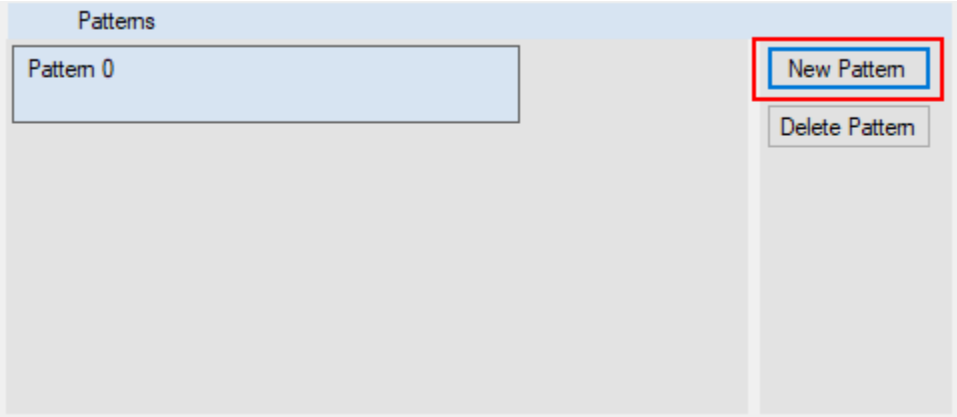
5) Start the channel.



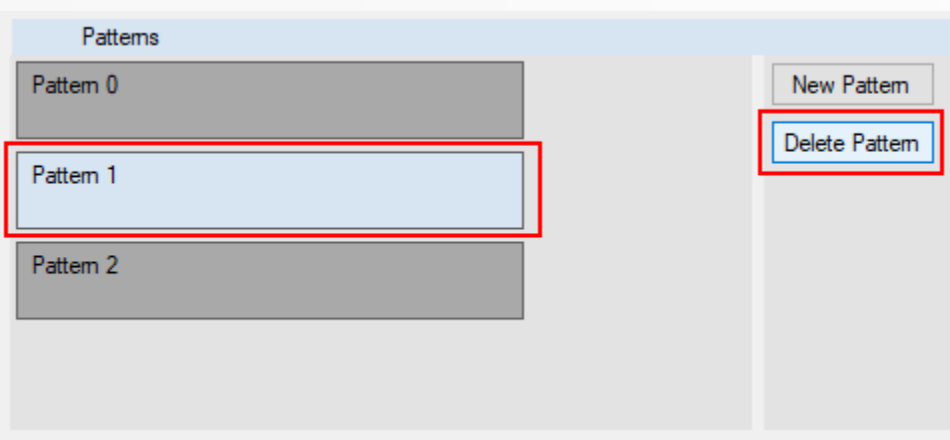
Creating and Deleting Patterns

A pattern is comprised of the defined waveform, the number of repetitions, and delay in between repetitions.

To create a new pattern, click the “New Pattern” button.



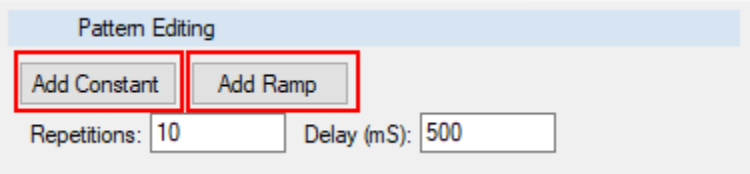
To delete a pattern, select the pattern in the pattern list (which will highlight it in blue), and click “Delete Pattern”.



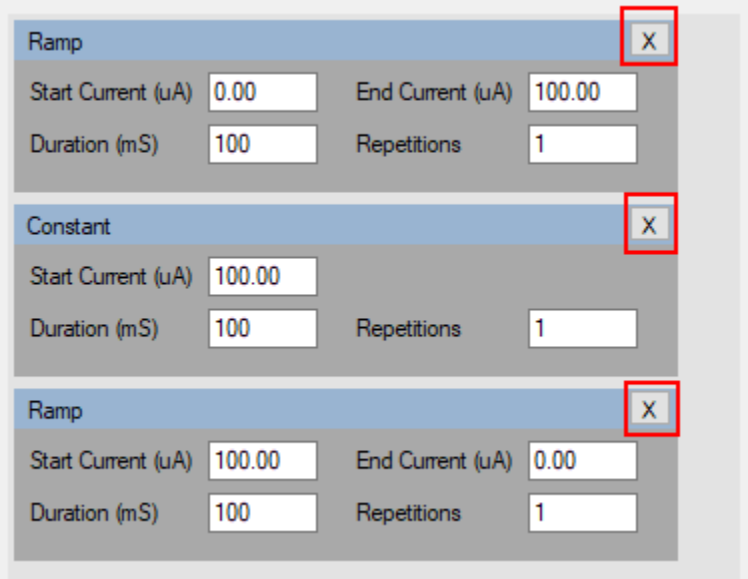
A pattern can only be deleted if no channels have the pattern selected.

Adding and Deleting Pattern Primitives

A waveform is composed of pattern primitives. To add a pattern primitive, click on one of the pattern primitive buttons.



To delete a pattern primitive, click the “X” on it.



Pattern Values

Repetitions is the number of times the pattern repeats.

Delay is the delay in between repetitions, and is in milliseconds. During this time, the output current will be 0 microamps.

Pattern Primitive Types and Values

There are currently two types of pattern primitives: constants and ramps.

A Constant is a single current value held for a set period of time.

A Ramp sweeps from the start current to the end current across a set period of time.

Repetitions is the number of times the pattern primitive will repeat.

The start or end current values are in microamps, and can be set to a minimum of 0 microamps and a maximum of 100 microamps. By default, the start or end current values entered will be quantized to the actual value that the LED will receive. For example, entering a value of 50 microamps will get quantized to 49.80 microamps.

The duration value is in milliseconds.

Saving and Loading Configurations

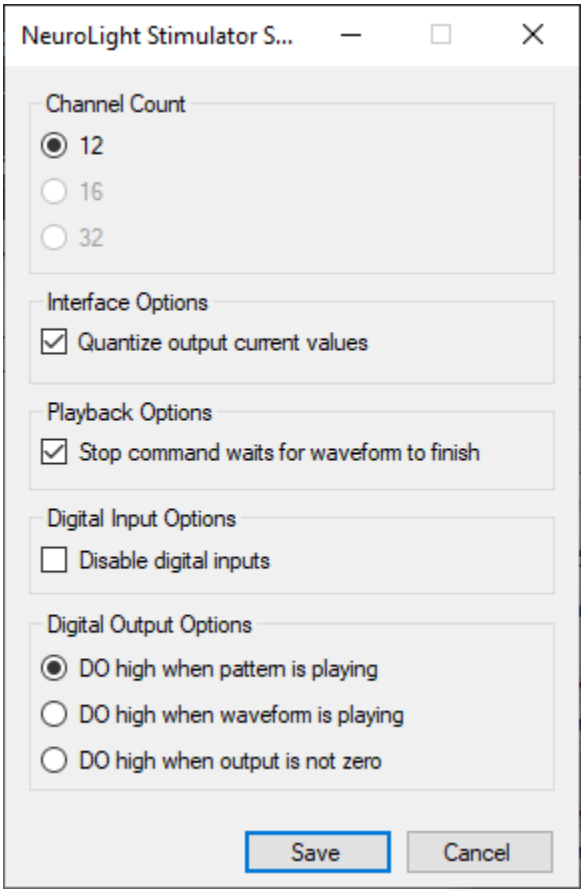
NeuroLight Stimulator settings files contains the patterns, primitives, application settings, and channel pattern assignments.

To save settings, go to File and click “Save Settings”.

To load settings, go to File and click “Load Settings”.

The application will warn you if there are any unsaved changes when exiting, and give you an opportunity to cancel exiting and save the configuration.

Settings



Channel Count: currently can only be set to 12 channels.

Interface Options: When “Quantize Output Current Values” is selected, the values typed into a pattern primitive current value will be quantized to the actual current value the LED will receive.

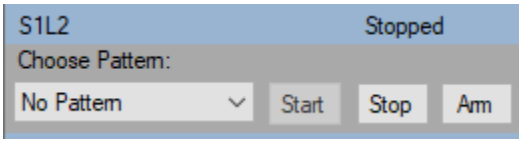
Playback Options: When “Stop command waits for waveform to finish playing” is selected, the Stop button waits until the current repetition of the defined waveform has completed before stopping the channel. Otherwise the channel is immediately stopped.

Digital Input Options: When “Disable Digital Inputs” is selected, the digital inputs will be disabled.

Digital Output Options: Sets how the digital output behaves during pattern playback.

Channel Controls

Each channel has controls for settings the pattern, arming, starting, and stopping.



Start - Starts playback of the pattern. This control is only enabled when the channel has a pattern selected and is armed.

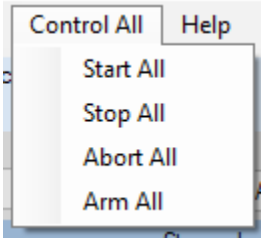
Stop - Stops playback of the pattern.

Arm - Arms the currently selected pattern.

Choose Pattern: Chooses a pattern from the available patterns.

A channel can only be started if it’s armed. Changing the selected pattern, or editing the selected pattern will cause the channel to dis-arm.

Control All



The Control All menu provides controls for starting, stopping, and aborting all channels.

Start All – Start all armed channels.

Stop All – Stop all running channels (channels stop after their current repetition is finished).

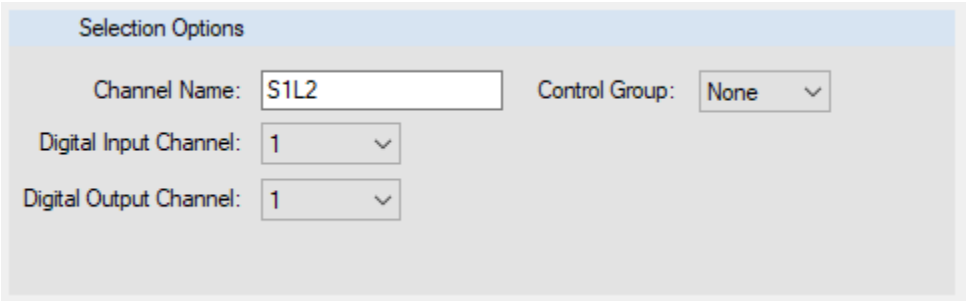
Abort All – Abort all running channels immediately.

Arm All – Arms all channels that have a pattern selected.

Selection Options

The “Selection Options” area of the main window displays options for the currently selected channel or pattern.

When a channel is selected, options for the channel’s name, digital input and output assignments, and group assignment are presented.



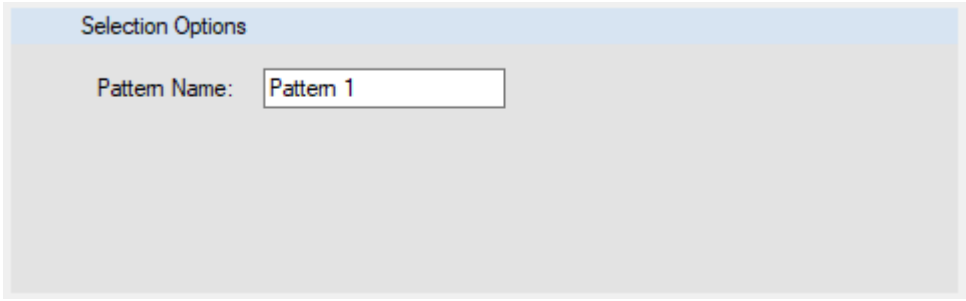
Channel Name – Changing the text here will change the selected channel’s name

Digital Input Channel – This dropdown selects which digital input channel controls the selected channel.

Digital Output Channel – This dropdown selects which digital output channel will respond to the currently selected channel.

Control Group – This dropdown selects which control group the currently selected channel is assigned to. See the section on control groups for more information.

When a pattern is selected, options for the pattern (currently only the pattern’s name) are presented.



Pattern Name – changing the text here will change the selected pattern’s name.

Control Group

Control groups allow for starting and stopping multiple channels from the user interface at the same time.

Control groups do not affect how channels respond to digital input. Control groups only apply to user interface controls.

When multiple channels are set to the same control group, the control buttons on each of those channels work as follows.

Start – Starts every channel in the group that is eligible to be started (meaning any channel that has a pattern assigned and is armed).

Stop – Stops every running channel in the group.

Arm currently only affects the currently selected channel. This may change in the future.

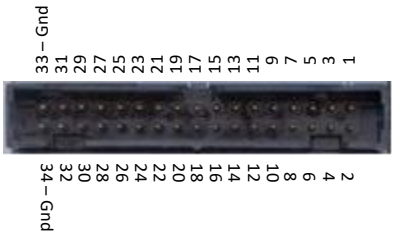
Note that channels in a group can have different patterns assigned to them. A channel that stops on its own when its pattern ends won't stop other running channels in the same group.

Digital Input

The NeuroLight Stimulator channels can be started and stopped through the digital input pins on the stimulator hardware.

Each channel has a corresponding digital input pin. A high (+3.3V) level on a pin will start the channel assigned to that pin, and a low (0V) level will stop the channel.

The channel will only start if it's armed.



DI 1 – S1L1
DI 2 – S1L2
DI 3 – S1L3
DI 4 – S2L1
DI 5 – S2L2
DI 6 – S2L3
DI 7 – S3L1
DI 8 – S3L2
DI 9 – S3L3
DI 10 – S4L1
DI 11 – S4L2
DI 12 – S4L3
DI 33 – GND
DI 34 - GND

Digital Output

The NeuroLight Stimulator channels can be monitored through the digital output pins on the stimulator hardware.

By default, the DO pin for each channel goes high (+3.3V) when that channel is playing, and low (0V) when it is stopped. This behavior can be altered in the settings.

DO 1 – S1L1
DO 2 – S1L2
DO 3 – S1L3
DO 4 – S2L1
DO 5 – S2L2
DO 6 – S2L3
DO 7 – S3L1
DO 8 – S3L2
DO 9 – S3L3
DO 10 – S4L1
DO 11 – S4L2
DO 12 – S4L3
DO 33 – GND
DO 34 - GND

Known Issues in NeuroLight Stimulator 1.0.0

- Leading 0's in text fields don't get removed
- Digital input is not disabled when "No Pattern" is selected on a channel
- Channel can be started when pattern is changed but not re-armed if Start is clicked after editing pattern field
- If the headset is unplugged from the control box, the application must be restarted